What is claimed is:

1. An ATM test equipment comprising:

transponder circuitry for formulating an ATM test cell, according to a selected one of predetermined test modes, with a header identifying a test point and a response point and a test mode value identifying the selected test mode, transmitting the test cell to an ATM switching system, and receiving a response cell containing said test mode value from the ATM switching system; and

measurement circuitry for analyzing data contained in the received response cell according to the test mode value of the response cell.

2. The ATM test equipment of claim 1, wherein said data is a sequence number of a cell and said measurement circuitry is configured to use the sequence number of the received response cell to determine a cell loss rate.

3. The ATM test equipment of claim 1, wherein said data is a pseudonoise bit pattern and said measurement circuitry is configured to use the pseudonoise bit pattern contained in the received response cell to determine a bit error rate.

4. The ATM test equipment of claim 1, wherein said transponder circuitry is configured to:

receive said test cell from the ATM switching system;

formulate said response cell with a header identifying said source point and said response point and a copy of data contained in the received

test cell, and

transmit the response cell to said ATM switching system.

5. The ATM test equipment of claim 1, further comprising timing circuitry for producing a first time record indicating the transmit time of said test cell and a second time record indicating the receive time of said response cell, and wherein said measurement circuitry is configured to use said first and second time records to determine a propagation delay time.

6. An ATM testing system for testing an ATM network between a source node and a responder node,

said source node comprising:

transponder circuitry for formulating a test cell, according to a selected one of predetermined test modes, with a header identifying said source node and said responder node and a test mode value identifying the selected test mode, transmitting the test cell to said ATM network, and receiving a response cell containing said test mode value from the network; and

measurement circuitry for analyzing data contained in the received response cell according to the test mode value contained therein,

said responder node comprising transponder circuitry for receiving said test cell and formulating a cell, according to the test mode value of the received test cell, with a header identifying said responder node and said source node and the test mode value of the received test cell, and transmitting the formulated cell to said network as said response cell.

7. The ATM testing system of claim 6, wherein said responder

node is configured to formulate said response cell with a copy of data contained in the received test cell, and transmit the response cell to said network without delay.

8. The ATM testing system of claim 7, wherein said copied data is a cell sequence number and the measurement circuitry of the source node is configured to use the cell sequence number contained in the received response cell to determine a cell loss rate.

9. The ATM testing system of claim 7, wherein said copied data is a pseudonoise bit pattern and the measurement circuitry of the source node is configured to use the pseudonoise bit pattern contained in the received response cell to determine a bit error rate.

10. The ATM testing system of claim 7, wherein said source node further comprises timing circuitry for producing a first time record indicating the transmit time of said test cell and a second time record indicating the receive time of said response cell,

wherein the measurement circuitry is configured to use said first and second time records to determine a round-trip propagation delay time.

11. The ATM testing system of claim 10, wherein said responder node further comprises time stamp circuitry for producing a first time stamp indicating the receive time of said test cell and a second time stamp indicating the transmit time of said response cell,

wherein the responder node is configured to insert said first and second time stamps in the response cell,

wherein said measurement circuitry is configured to use said first and second time records of said time-stamp circuitry and said first and second time stamps of the received response cell to determine a propagation delay time of a first channel in the direction from said source node to said responder node, and a propagation delay time of a second channel in the direction from said responder node to said source node.

12. The ATM testing system of claim 11, wherein said transponder circuitry is configured to transmit said test cell in response to a first frame timing signal and wherein said responder node is configured to transmit said response cell in response to a second frame timing signal which occurs immediately following the receipt of the test cell from the network.

13. The ATM testing system of claim 12, wherein the measurement circuitry is configured to use said first and second time records and said first and second time stamps to determine a timing difference between said source and responder nodes.

14. The ATM testing system of claim 6,

wherein the transponder circuitry is configured to transmit said test cell in response to a first frame timing signal, and said responder node is configured to transmit said response cell in response to a second frame timing signal,

wherein said copied data is a cell sequence number and the measurement circuitry of the source node is configured to use the cell sequence number contained in the received response cell to determine a cell loss rate.

15. The ATM testing system of claim 6,

wherein said transponder circuitry is configured to transmit said test cell in response to a first frame timing signal, and said responder node is configured to transmit said response cell in response to a second frame timing signal,

wherein said copied data is a pseudonoise bit pattern and the measurement circuitry of the source node is configured to use the pseudonoise bit pattern contained in the received response cell to determine a bit error rate.

16. The ATM testing system of claim 6,

wherein said responder node, when operating in a first test mode, is configured to formulate said response cell with a copy of data contained in the received test cell and transmit the response cell to said network without delay,

wherein the transponder circuitry, when operating in said first test mode, is configured to produce a first time record indicating the transmit time of said test cell and a second time record indicating the receive time of said response cell,

wherein the transponder circuitry, when operating in a further test mode, is configured to formulate a second test cell according to the further test mode with header information identifying said source and responder nodes and a second test mode value identifying the further test mode, transmit the second test cell to said network in response to a first frame timing signal, and produce a third time record indicating the transmit time of the second test cell,

wherein said responder node, when operating in said further test

mode, is configured to receive the second test cell from the network, formulate a second response cell with a header identifying said source and said responder nodes according to the second test mode value of the received test cell, and transmit the second response cell to the network in response to a second frame timing signal which occurs immediately after said second response cell is formulated,

wherein the transponder circuitry, when operating in said further test mode, is configured to produce a fourth time record indicating the receive time of said second response cell, and

wherein the measurement circuitry, when operating in said further test mode, is configured to determine from said third and fourth time records, a timing difference between said source and remote responder nodes, a first propagation delay time of a first channel in a direction from said source node to a remote responder node, and a second propagation delay time of a second channel in a direction from said remote responder node to said source node.

17. The ATM testing system of claim 16, wherein said source node, when operating in said further test mode, is configured to solve the following equations to determine said timing difference $\Delta\phi$, said first propagation delay time Td_1, and said second propagation delay time Td_2:

$$\Delta\phi = T1r - T1s - Tw/2$$

$$Td_1 = \Delta\phi - T1r + T1s + Tw$$

$$Td_2 = T1r - T1s - \Delta\phi$$

where Tw represents said round-trip propagation delay time.

18. A method of testing an ATM network, comprising the steps of:

a) at a source node, formulating, according to a selected one of

predetermined test modes, a test cell with a cell header identifying said source node and a responder node and a test mode value identifying the selected test mode, and transmitting the cell to said ATM network;

b) receiving, at said responder node, said test cell and formulating, according to the test mode value of the received test cell, a response cell containing a cell header identifying said source node and said responder node and the test mode value of the received test cell, and transmitting the response cell to said network;

c) receiving, at said source node, said response cell from the network; and

d) analyzing, at said source node, data contained in the received response cell according to the test mode value of the received response cell.

19. The method of claim 18, further comprising the step of analyzing, at said responder node, data contained in the test cell received from the network.

20. The method of claim 18, wherein said response cell contains a sequence number, and wherein step (d) comprises determining a cell loss rate by counting a plurality of said sequence number contained in response cells successively received from the network.

21. The method of claim 18, wherein said response cell contains a pseudonoise bit pattern, and wherein step (d) comprises determining a bit error rate of said pseudonoise bit pattern.

22. The method of claim 18,

wherein step (a) comprises producing a first time record indicating the transmit time of said test cell,

wherein step (b) comprises formulating said response cell with a copy of data contained in the received test cell and transmitting the response cell to said network without delay,

wherein step (c) further comprises producing a second time record indicating the receive time of said response cell received from said network, and

wherein step (d) comprises determining a round-trip propagation delay time from said first and second time records.

23. The method of 20,

wherein step (a) comprises producing a first time record indicating the transmit time of said test cell,

wherein step (b) comprises formulating the response cell with a copy of said sequence number contained in the received test cell and transmitting the response cell to said network without delay,

wherein step (c) comprises producing a second time record indicating the receive time of said response cell, and

wherein step (d) comprises determining a cell loss rate of a loopback channel by counting a plurality of said sequence number contained in response cells successively received from the network, and determining a round-trip propagation delay time from said first and second time records.

24. The method of 21,

wherein step (a) comprises producing a first time record indicating the transmit time of said test cell,

wherein step (b) comprises formulating said response cell with a copy of said pseudonoise bit pattern contained in the received test cell and transmitting the response cell to said network without delay,

wherein step (c) comprises producing a second time record indicating the receive time of said response cell, and

wherein step (d) comprises determining a bit error rate of the pseudonoise bit pattern, and determining a round-trip propagation delay time from said first and second time records.

25. The method of claim 18,

wherein step (a) comprises transmitting said test cell in response to a first frame timing signal and producing a first time record indicating the transmit time of said test cell,

wherein step (b) comprises producing a first time stamp indicating the receive time of said test cell and a second time stamp indicating the transmit time of said response cell, formulating a response cell containing said first and second time stamps, and transmitting the response cell to the network in response to a second frame timing signal,

wherein step (c) further comprises producing a second time record indicating the receive time of said response cell,

wherein step (d) comprises determining, from said first and second time records and said first and second time stamps, a propagation delay time of a first channel in a direction from said source node to said responder node, a propagation delay time of a second channel in a direction from said responder node to said source node, and a timing difference between said source and responder nodes.

26. The method of claim 18,

wherein step (a) comprises producing a first time record indicating the transmit time of said test cell,

wherein step (b) comprises formulating a response cell with a copy of data contained in the received test cell into the response cell and transmitting the response cell to said network without delay,

wherein step (c) further comprises producing a second time record indicating the receive time of said response cell, and

wherein step (d) comprises determining a round-trip propagation delay time from said first and second time records,

further comprising the steps of:

e) at said source node, formulating, according to a further test mode, a test cell with a cell header identifying said source node and said responder node and a second test mode value identifying the further test mode, transmitting the cell to said ATM network in response to a first frame timing signal, and producing a third time record indicating the transmit time of the test cell;

f) at said responder node, receiving, said test cell and formulating, according to the test mode value of the received test cell, a response cell containing a cell header identifying said source node and said responder node, and transmitting the response cell to said network in response to a second frame timing signal;

g) at said source node, receiving the response cell from the network and producing a fourth time record indicating the receive time of said response cell; and

h) determining, from said third and fourth time records, a timing difference between said source and remote responder nodes, a first

propagation delay time of a first channel in a direction from said source node to a remote responder node, and a second propagation delay time of a second channel in a direction from said remote responder node to said source node.

27. The method of claim 26, wherein step (h) comprises solving the following equations to determine said timing difference $\Delta\phi$, said first propagation delay time Td_1, and said second propagation delay time Td_2:

$$\Delta\phi = T1r - T1s - Tw/2$$

$$Td_1 = \Delta\phi - T1r + T1s + Tw$$

$$Td_2 = T1r - T1s - \Delta\phi$$

where Tw represents said round-trip propagation delay time.

28. A method of testing an ATM switch between a source point and a response point, said source and response points being connected to said ATM switch, comprising the steps of:

a) at said source point, formulating, according to a selected one of predetermined test modes, a test cell with a header identifying said source and response points and a test mode value identifying the selected test mode, and transmitting the cell to said ATM switch;

b) at said response point, receiving said test cell and formulating a response cell with a header identifying said source and response points and the test mode value of the received test cell, and transmitting the response cell to said ATM switch;

c) at said source point, receiving said response cell from the ATM switch; and

d) at said source point, analyzing data contained in the received response cell according to the test mode value of the received response cell.

29. The method of claim 27, wherein step (b) further comprises formulating said response cell with a copy of data contained in the received test cell.

30. The method of claim 27, wherein said response cell contains a sequence number, and wherein step (d) comprises using the sequence number contained in the received response cell to determine a cell loss rate.

31. The method of claim 27, wherein said response cell contains a pseudonoise bit pattern, and wherein step (d) uses said pseudonoise bit pattern to determine a bit error rate.